

# ONLINE QUIZZES IMPROVE LEARNING OUTCOMES IN UNDERGRADUATE FIRST-YEAR CHEMISTRY

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## ABSTRACT

'Practice makes perfect; bad practice makes perfectly bad' (Rozinsky, n.d.). Practice, study and revision without guidance and feedback is not effective; effective study, revision and learning requires guidance (Ericsson, Krampe, & Tesch-Romer, 1993).

Online quizzes delivered via learning management systems provide opportunities for formative assessment with immediate feedback (Lowry, 2005; McLoughlin, & Taji, 2005). Such quizzes, drawing on question banks of thousands of questions have been in use in first year undergraduate chemistry at the author's institution for over six years. The use of a library containing thousands of questions incorporates elements of mastery learning (e.g., Bearman & Russell, 1987) as students have multiple attempts of each quiz; it is estimated that students can repeat each quiz up to 6 times before there is significant repetition of questions.

While early online quizzes were limited to multiple-choice questions, modern learning management systems permit the use of many types of questions, including fill-in-the-blank, matching, numerical calculation, and ordering a list. Some exemplars of online quiz questions will be presented. Statistical analyses show strong correlation between quiz performance and the final unit result, as well as a good correlation between the number of quizzes attempted and the final unit result.

This research has human research ethics approval (DUHR EC 29 2008 and DU- STEC 23 12 LIM).

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